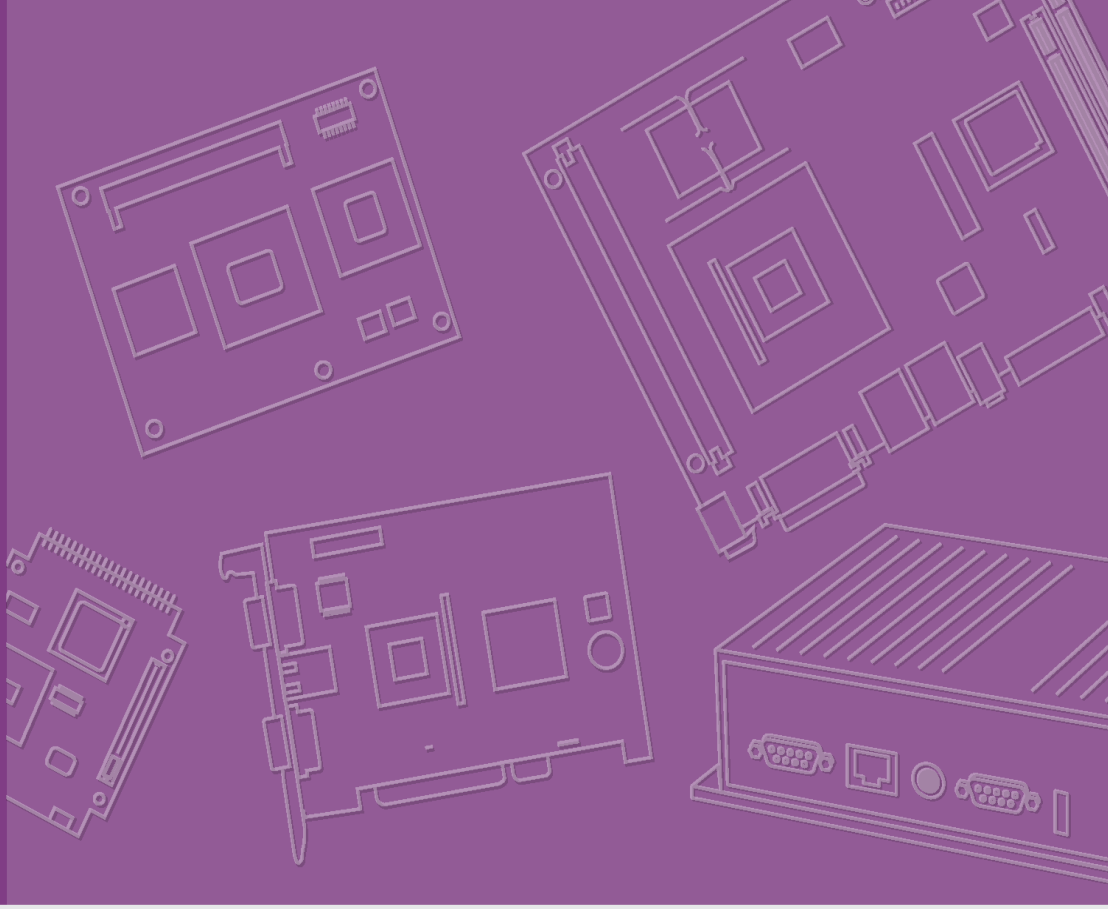

User Manual

IDK-2131WN-K2HDA1E

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5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Chapter 1

Handling Precautions

1.1 Handling Precautions

1. Since front polarizer is easily damaged, pay attention not to scratch it.
2. Be sure to turn off the power supply when inserting or disconnecting from the input connector.
3. Wipe off water drops immediately. Long contact with water may cause discoloration or spots.
4. When the panel surface is soiled, wipe it with absorbent cotton or other soft cloths.
5. Since the panel is made of glass, it may break or crack if dropped or bumped on a hard surface.
6. Since a CMOS LSI is used in this module, take care with static electricity and ensure you are earthed when handling.
7. Do not open or modify the module assembly.
8. Do not press the reflector sheet at the back of the module.
9. In case a module has to be put back into the packing container slot after it was removed, please press the far ends of the LED light bar reflector softly, otherwise the TFT module may get damaged.
10. At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt it.
11. After installation of the TFT Module into an enclosure, no bending or twisting forces should applied to the TFT Module.
12. Small amount of materials having no flammability grade are used in the LCD module. The LCD module should be supplied by power that complies with requirements of Limited Power Source (IEC60950 or UL1950).

Chapter 2

Overview

2.1 General Description

IDK-2131WN-K2HDA1E is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, a driver circuit, and backlight system. The screen format is intended to support the 1366x768 HD-WIDE mode (Non-interlace) screen. Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot. It has been designed to apply the 8-bit 1 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.. All input signals are LVDS interface compatible. Driver board of backlight is included.

2.2 Display Characteristics

The following items are characteristics summary on the table under 25°C condition:

Table 2.1: Display Characteristics

Items	Unit	Specifications
Screen Diagonal	[inch]	31.5
Active Area	[mm]	697.685 (H) x 392.256 (V)
Pixels H x V		1366x3 (RGB) x 768
Pixel Pitch	[mm]	0.51075
Pixel Arrangement		R.G.B. vertical stripe
Display Mode		Normally Black
Nominal Input Voltage VDD	[Volt]	12.0 (typ.)
Typical Power Consumption	[Watt]	56.6(PDD=3.6W +PLED=53W)
LED driver board Power Consumption	[Watt]	5.3 (90% efficiency)
Weight	[Grams]	7000 (typ.)
Physical Size	[mm]	760.0 (W) x 450.0 (H) x 46.9 (D) (with driver)
Electrical Interface		One Channel LVDS
Surface Treatment		Anti-Glare, 3H(Haze=11%)
Support Color		16.7 M, 8 bit
Temperature Range Operating Storage (Non-Operating)	[°C] [°C]	0 to +50 -20 to +60
RoHS Compliance		RoHS Compliance

2.3 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

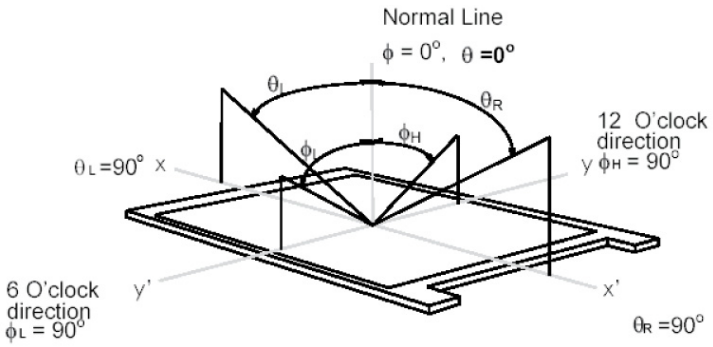
Table 2.2: Optical Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)		89 89	-	1
		Vertical (Upper) CR = 10 (Down)		89 89	-	
Luminance Uniformity	[%]	9 Points	75	80		2, 3
Optical Response Time	[msec]	Rising	-	-	-	5
		Falling	-	-	-	
		Rising + Falling	-	6.5	-	
Color/Chromaticity Coordinates (CIE 1931)		White x White y	- -	0.3160 0.3530	- -	4
Color Temp.	K		6000	6500		4
White Luminance	[cd/m^2]		1100	1200	-	4
Contrast Ratio			-	3000	-	4

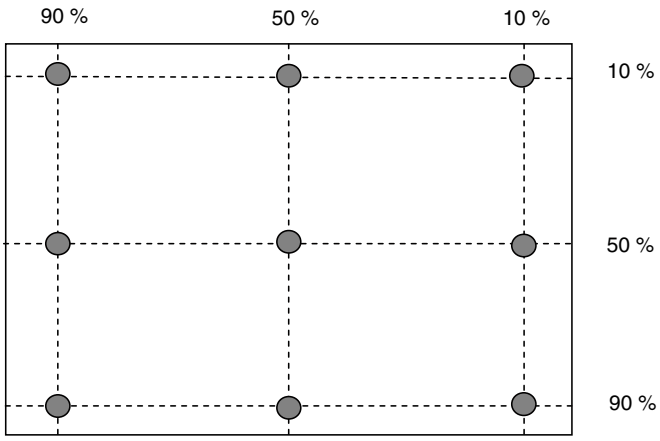
Optical Equipment: BM-7, DT-100 or equivalent.

Note1! *Definition of viewing angle.*

Viewing angle is the measurement of contrast ratio ≥10, at the screen center, over a 180()° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ)° horizontal left and right, and 90° (ϕ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



Note2! *9 points position.*

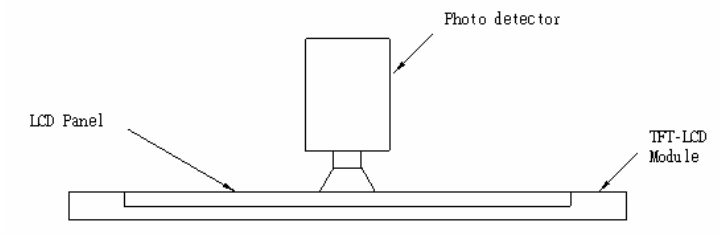


Note3! *The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance.*

$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

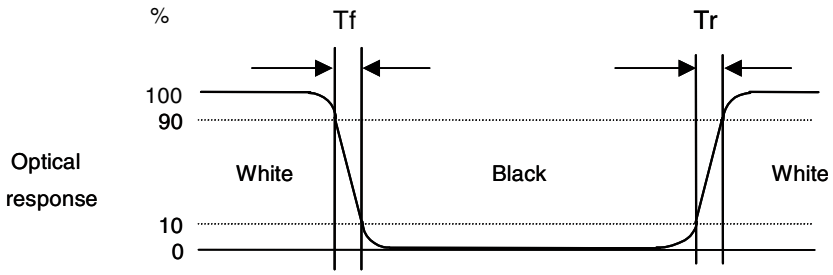
Note4! *Measurement method.*

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measurement. In order to stabilize the luminance, the measurement should be executed after the backlight has been lit for 30 minutes in a stable, windless and dark room. Optical Equipment: DT-100 or equivalent.



Note5! *Definition of response time:*

The output signals of the photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is the interval between the 10% and 90% of amplitudes. Please refer to the figure below.



Chapter 3

Functional Block Diagram

3.1 Functional Block Diagram

The following diagram shows the functional block of the 31.5 inches Color TFT-LCD Module:

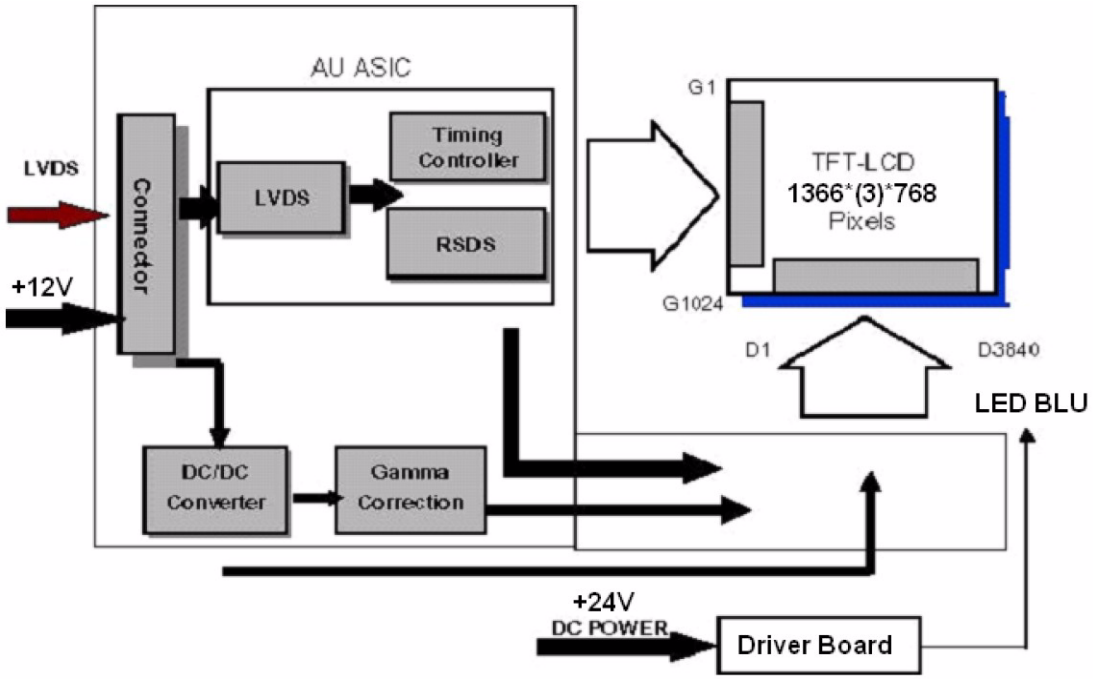


Figure 3.1 Functional Block Diagram

Chapter 4

Absolute Maximum Ratings

4.1 Absolute Maximum Ratings

Absolute maximum ratings of the module is as following:

4.1.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	VCC	-0.3	+13.5	[Volt]	Note 1, 2

4.1.2 Absolute Ratings of Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED BLU Current	ILed	-	450*7	[mA]	Note 1, 2

4.1.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[˚C]	Note 3
Operation Humidity	HOP	10	90	[%RH]	
Storage Temperature	TST	-20	+60	[˚C]	
Storage Humidity	HST	10	90	[%RH]	

Note1! *With in Ta= 25˚C.*

Note2! *Permanent damage to the device may occur if maximum values are exceeded.*

Note3! *For quality performance, please refer to AUO IIS (Incoming Inspection Standard).*

Chapter 5

Electrical Characteristics

5.1 Power Specification

Input power specifications are as follows:

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
Vcc	Logic/LCD Drive Voltage	10.8	12.0	13.5	[Volt]	
IDD	Input Current	-	300	400	[mA]	
PDD	VDD Power	-	3.6	4.32	[Watt]	
IRush	Inrush Current	-	-2.0	3.0	[A]	Note 1

Note1! *Duration:50 msec.*

Note2! *Maximum wet bulb should be 39°C and no condensation. The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40 °C, the wet bulb temperature must not exceed 39 °C.*

Note3! *Surface temperature is measured at 50°C dry condition.*

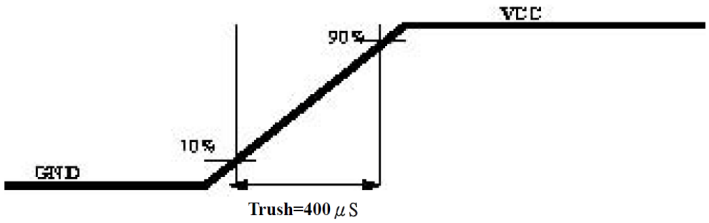
5.1.1 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

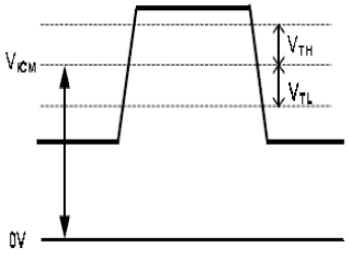
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VTH	Differential Input High Threshold	-	-	+100	[mV]	Note 1
VTL	Differential Input Low Threshold	-100	-	-	[mV]	Note 1
V_{ICM}	Differential Input Common Mode Voltage	1.1	1.25	1.4	[V]	Note 1

Note!

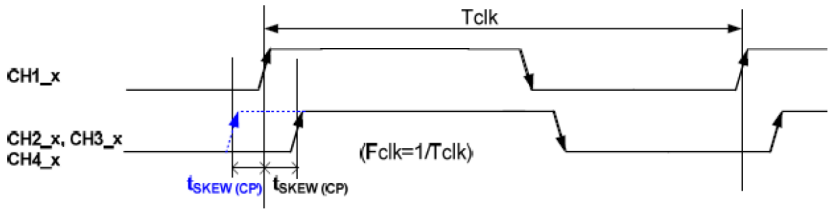
1. *The ripple voltage should be controlled under 10% of Vcc.*
2. *Test Condition:*
   (1) VDD=12.0V
   (2) Fv=60Hz
   (3) FCLK=82Mhz(Typ.)
   (4) Temperature=25° C
   (5) Test pattern: White Pattern
3. *Measurement condition: Rising time=400 us.*



4. *V_{ICM}=1.25 V.*



5. *Input Channel Pair Skew Margin.*



6. *Do not attach a conducting tape to the lamp connecting wire. If the lamp wire is attached to conducting tape, the TFT-LCD Module may have a low luminance and the inverter have abnormal action because current leakage occurs between the lamp wire and the conducting tape.*
7. *The relative humidity must not exceed 80% non-condensing at temperature of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C. When operating at low temperatures, the brightness of the CCFL will drop and the life time of CGFL will be reduced.*
8. *Specified values are for a single lamp only which is aligned horizontally. The lifetime is defined as the time which luminance of the lamp is 50% compared to its original value.*
   [Operating condition: Continuous operating at Ta = 25 ±2°C]

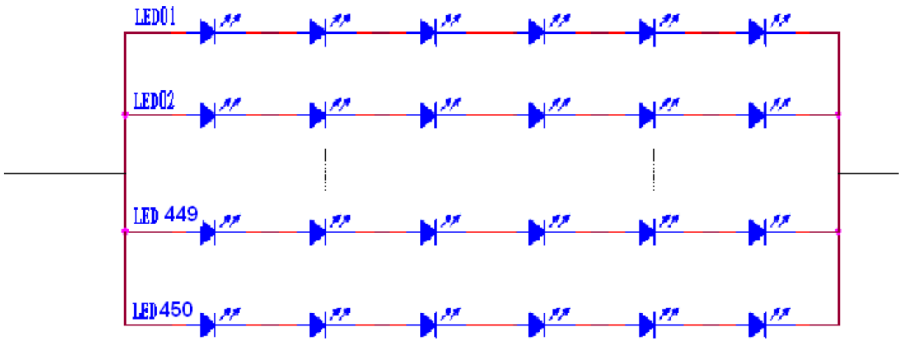
5.2 Backlight Driving Conditions

Parameter guideline for LED Light Bar Driver is under stable conditions at 25°C (Room Temperature):

Item	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
LED Voltage	VL	-		16.8	V	Note 2
LED Current	IL	-		450*7	mA	Note 3
LED lifetime	-	50,000	-	-	Hr	Note 1

Note1! *The "LED lifetime" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED current at 7mA.*

Note2! *The LED driving condition is defined for each LED module.(6 LED serial, a LED includes 1 chip).*



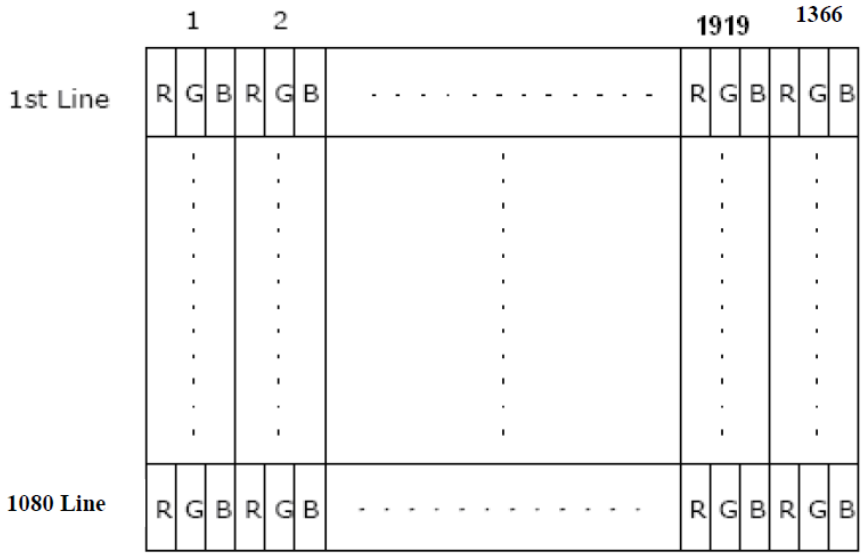
Note3! *The variance of LED Light Bar power consumption is ±10%. Calculator value for reference (IL x VL = PLED).*

Chapter 6

Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship between the input signal and LCD pixel format.



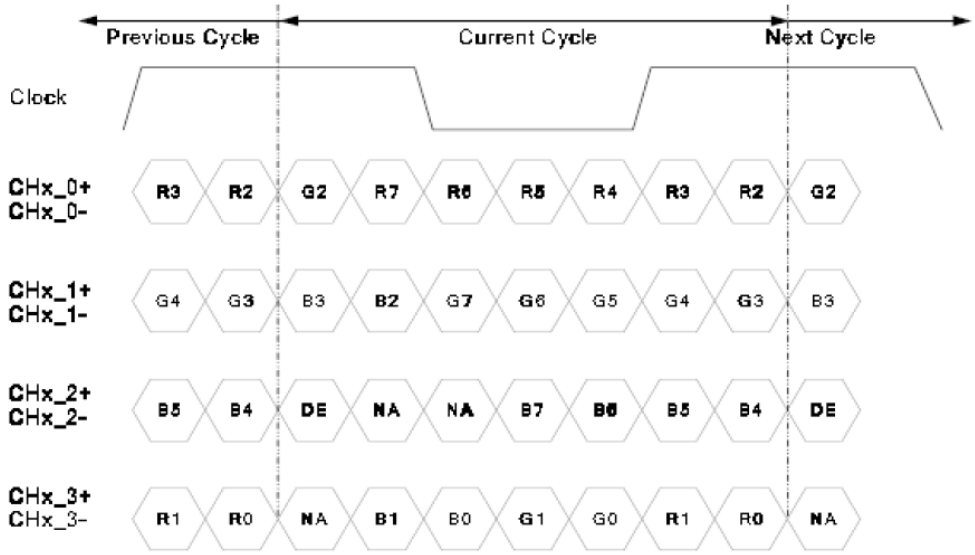
6.2 Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. See Table 6.1 for the connector pin definitions.

Table 6.1: Signal Description

PIN #	SIGNAL NAME	DESCRIPTION
1	VCC	+12V, DC, Regulated
2	VCC	+12V, DC, Regulated
3	VCC	+12V, DC, Regulated
4	VCC	+12V, DC, Regulated
5	GND	Ground and Signal Return
6	GND	Ground and Signal Return
7	GND	Ground and Signal Return
8	GND	Ground and Signal Return
9	LVDS Option	Open/High(3.3V) for NS, Low (GND) for JEIDA
10	Reserved	NC(Aging) AUO internal test
11	GND	Ground and Signal Return for LVDS
12	RIN0-	LVDS Channel 0 negative
13	RIN0+	LVDS Channel 0 Positive
14	GND	Ground and Signal Return for LVDS
15	RIN1-	LVDS Channel 1 negative
16	RIN1+	LVDS Channel 1 Positive
17	GND	Ground and Signal Return for LVDS
18	RIN2-	LVDS Channel 2 negative
19	RIN2+	LVDS Channel 2 Positive
20	GND	Ground and Signal Return for LVDS
21	RCLK-	LVDS Clock negative
22	RCLK+	LVDS Clock Positive
23	GND	Ground and Signal Return for LVDS
24	RIN3-	LVDS Channel 3 negative
25	RIN3+	LVDS Channel 3 Positive
26	GND	Ground and Signal Return for LVDS
27	Reserved	NC (AUO internal)
28	Reserved	NC (AUO internal)
29	GND	Ground and Signal Return
30	GND	Ground and Signal Return

6.3 The Input Data Format



Note! *R/G/B data 7: MSB*
R/G/B data 0: LSB
O = "First Pixel Data"
E = "Second Pixel Data°"

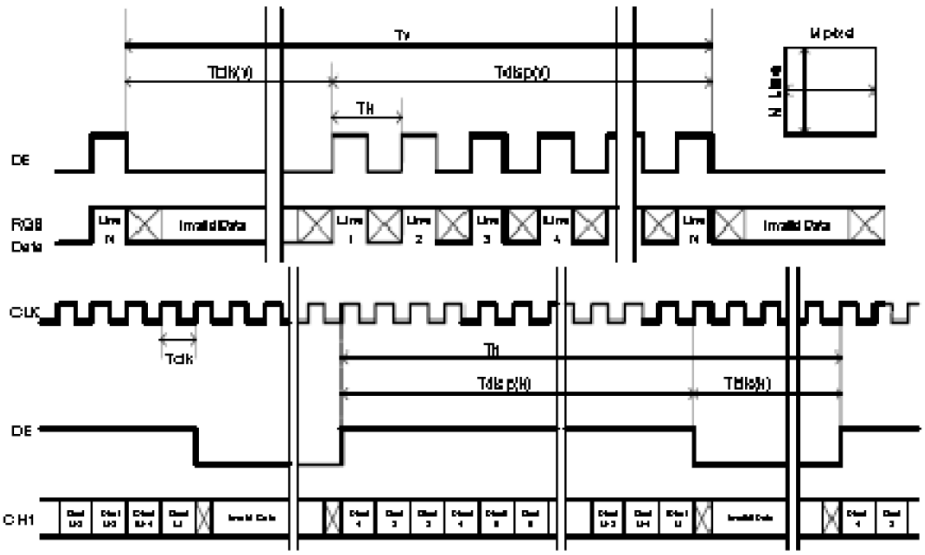
6.4 Interface Timing

6.4.1 Timing Characteristics

Item		Symbol	Min.	Typ.	Max.	Unit
Data CLK		Tclk	50	80	86	M
Horizontal Section	Period	Th	1460	1648	2000	Tclk
	Active	Tdisp (V)		1366		
	Blanking	Tblk (V)	94	282	634	
Vertical Section	Period	Tv	784	810	1015	Th
	Active	Tdisp (V)		1080		
	Blanking	Tblk (V)	16	42	247	

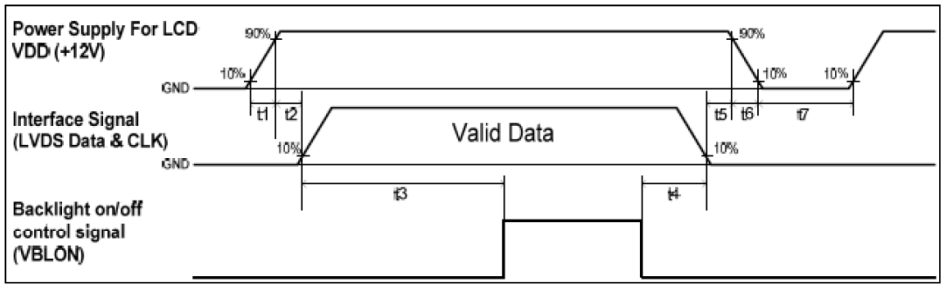
Note! *DE mode only.*

6.4.2 Input Timing Diagram



6.5 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.4	-	30	[ms]
T2	0.1	-	-	[ms]
T3	200	-	-	[ms]
T4	0*1	-	-	[ms]
T5	0	-	-	[ms]
T6	-	-	-*2	[ms]
T7	500	-	-	[ms]

Note! *The values of the table follow PSWG.*

Chapter 7

Connector & Pin Assignment

7.1 Connector & Pin Assignment

These connectors are capable of accommodating the following signals.

7.1.1 TFT LCD Module

7.1.1.1 Connector

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	Starconn
Type Part Number	093G30-B0001A-1
Mating Housing Part Number	FI-X30H

7.1.1.2 Pin Assignment

Pin#	Signal Name	Pin#	Signal Name
1	Vcc	2	Vcc
3	Vcc	4	Vcc
5	GND	6	GND
7	GND	8	GND
9	LVDS Option	10	Reserved
11	GND	12	RIN0-
13	RIN0+	14	GND
15	RIN1-	16	RIN1+
17	GND	18	RIN2-
19	RIN2+	20	GND
21	RCLK-	22	RCLK+
23	GND	24	RIN3-
25	RIN3+	26	GND
27	Reserved	28	Reserved
29	GND	30	GND

7.1.2 Backlight Unit

These connectors are capable of accommodating the following signals.

Connector Name / Designation	LED Light Bar Connector / Backlight lamp
Manufacturer	TKP TERMINAL/ TKP HOVSING
Type Part Number	TKP TERMINAL 8820T/ TKP HOVSING 8821-03
Mating Type Part Number	Wire VL 1007 24 AWG

7.1.2.1 Signals for LED light bar connector

Connector No.	Pin No.	Input	Color	Function
CN1	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN2	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN3	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN4	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN5	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN6	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit
CN7	1	GND	Black	Ground for backlight unit
	2	HI	Red	Power supply for backlight unit

Chapter 8

Mechanical Characteristics

8.1 Mechanical Characteristics

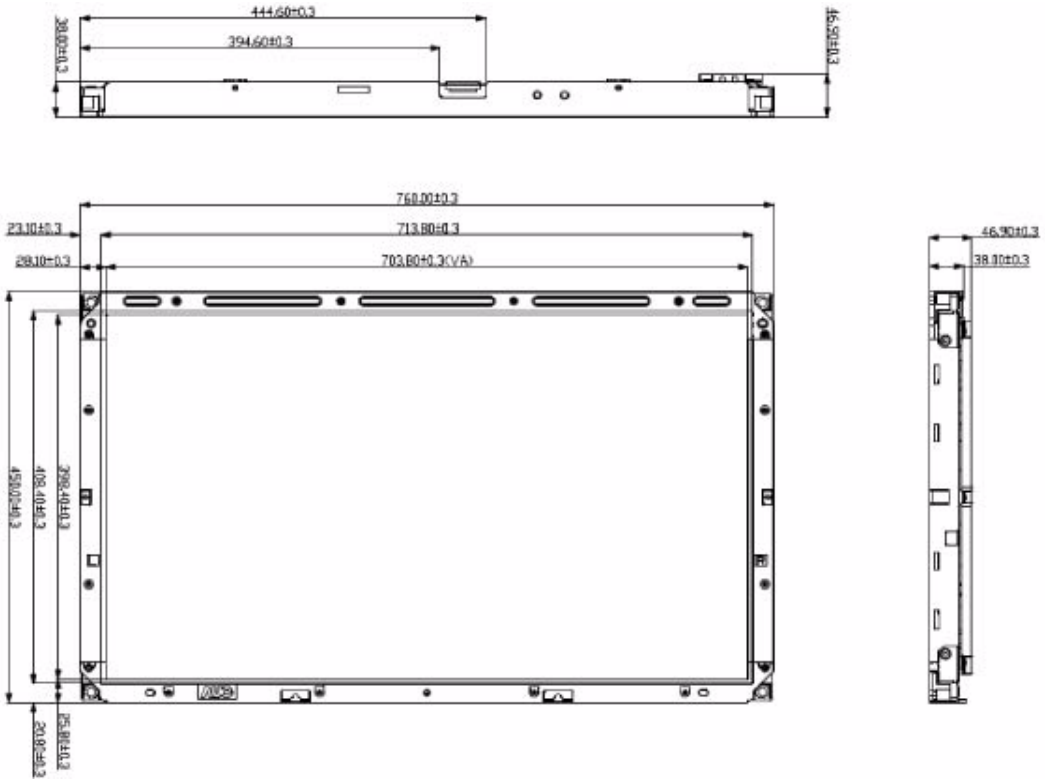


Figure 8.1 Front Side

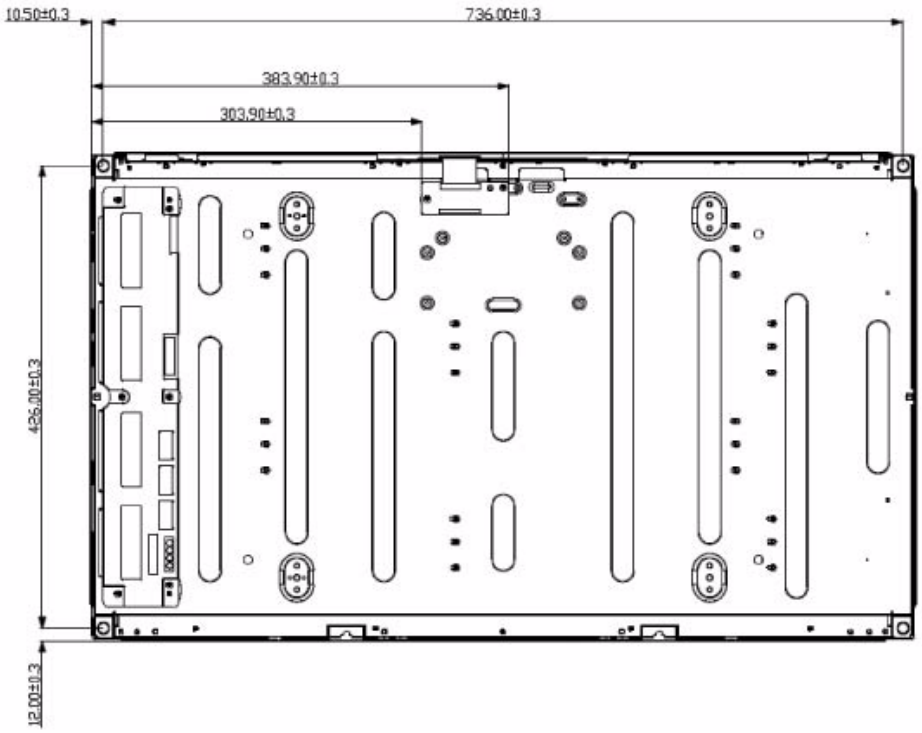


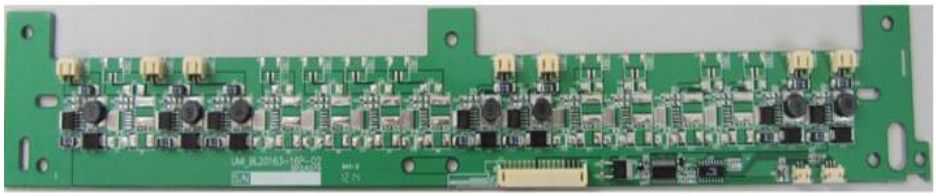
Figure 8.2 Rear Side

Chapter 9

LED Backlight Driver Board

9.1 Features

20 W x 7 port DC/DC LED Driver



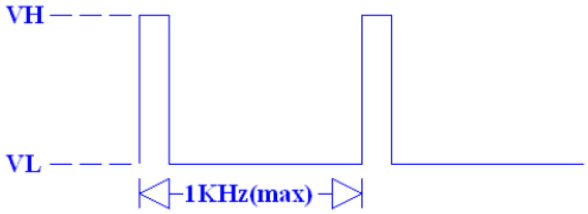
- DC 20 ~ 28 V Input Voltage Range
- 0.5 A x 7port (max.) Constant Output Current
- 90% efficiency @ Input voltage 24 V, output 17 V / 750 mA
- PWM range: 0 ~ 100%
- 2 type output dimmer select: 0 ~ 100%, 5 ~ 100%
- 2 type input dimmer select: analog/digital

9.2 Specifications

Table 9.1: Specification

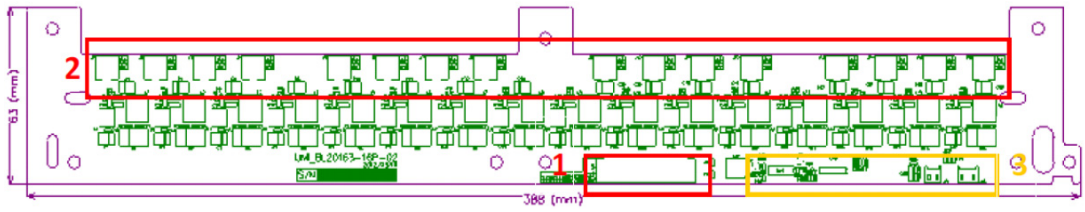
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
Input	Voltage		20	24	28	V
	Efficiency	Vin=24V Iout=750mA Vout=17V		90		%
	Power	1 port output	1.5		20	W
Output	Voltage	Input=24 V	10		20	V
	Current		100		1000	mA
	Current Accuracy	100mA ≤Iout ≤1000mA		±5	±10	%
	Protection	OVP				
Environ-ment	Thermal Shutdown			165		°C
	Operation Junction Temperature				125	°C
	Operating Temperature			-20	70	°C
	Storage Temperature			-40	85	°C
Dimmer (Note)	Dimmer Range		5		100	%
	Dimmer VH		2		5	V
	Dimmer VL		0		1.5	V
	Dimmer Frequency		0.25	0.5	1	KHz
ON/OFF Voltage	Von		3		5.5	V
	Voff		0		1.5	V

Note! *When the input PWM signal, the high-level digital output must be greater than the total output level of only 5% of output.*



9.3 Dimension

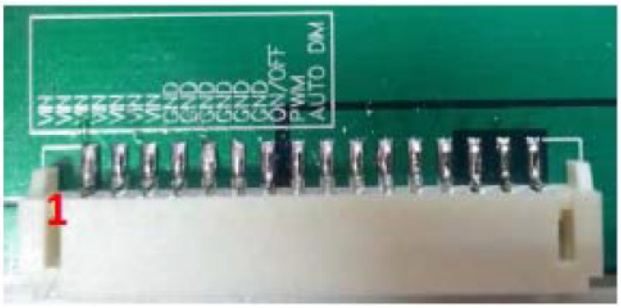
Item	Unit	Specifications
Physical Size	[mm]	388.0 (W) x 63.0 (L)



9.4 Connector and Pin Assignment

9.4.1 Input Connector & Pin Assignment

Red box on the map at [1] as input port, each pin is defined is as below (2.0 mm x 16 pin-SMD).

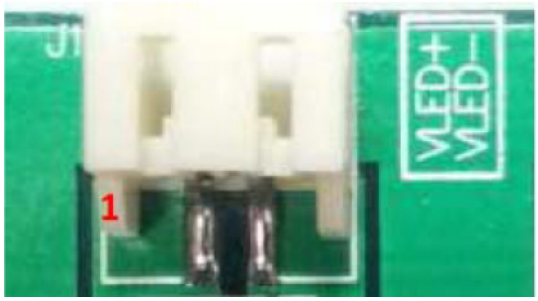


Model name: WQC-106DRWR00D

1	VIN
2	VIN
3	VIN
4	VIN
5	VIN
6	VIN
7	VIN
8	GND
9	GND
10	GND
11	GND
12	GND
13	GND
14	ON/OFF
15	PWN in
16	Auto dimmer

9.4.2 Output Connector & Pin Assignment

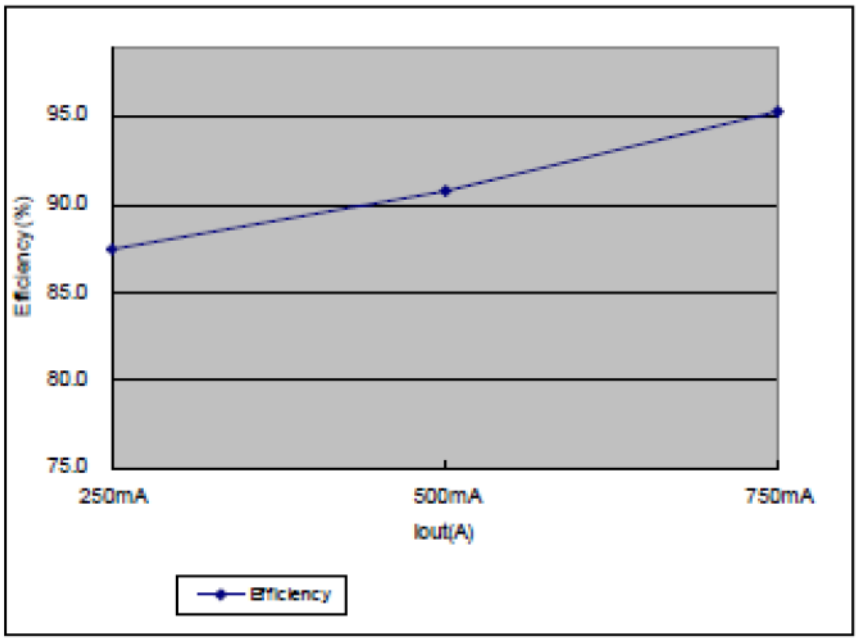
Red box on the map at [2] as LED output connector, each pin is defined is as below (2.0 mm x 2 pin-SMD).



Model name: WQC-106DRWR00D

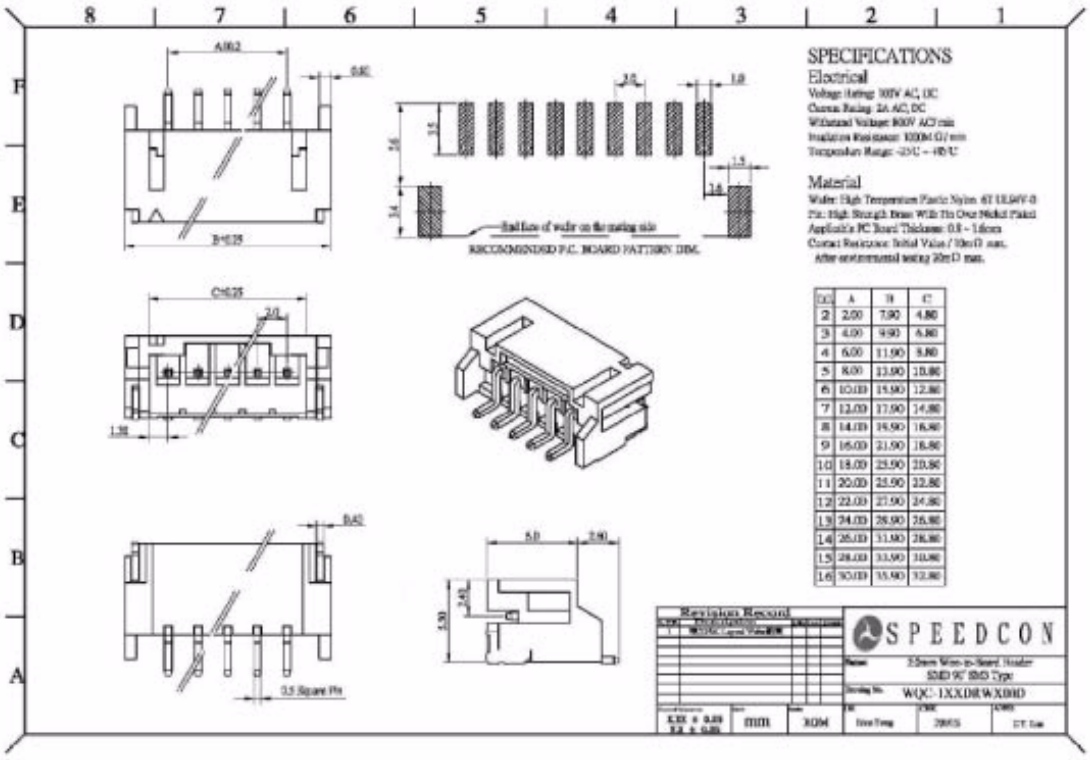
1	VLED+
2	VLED0-

9.5 Efficiency Test Report



SET IOUT	Vin(V)	Lin(A)	Vout(V)	Iout(A)	Efficiency
250mA	24.0	0.186	16	0.244	87.46
500mA	24.0	0.372	16.4	0.494	90.74
750mA	24.0	0.552	17	0.743	95.34

9.6 Input/Output Connector SPEC



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